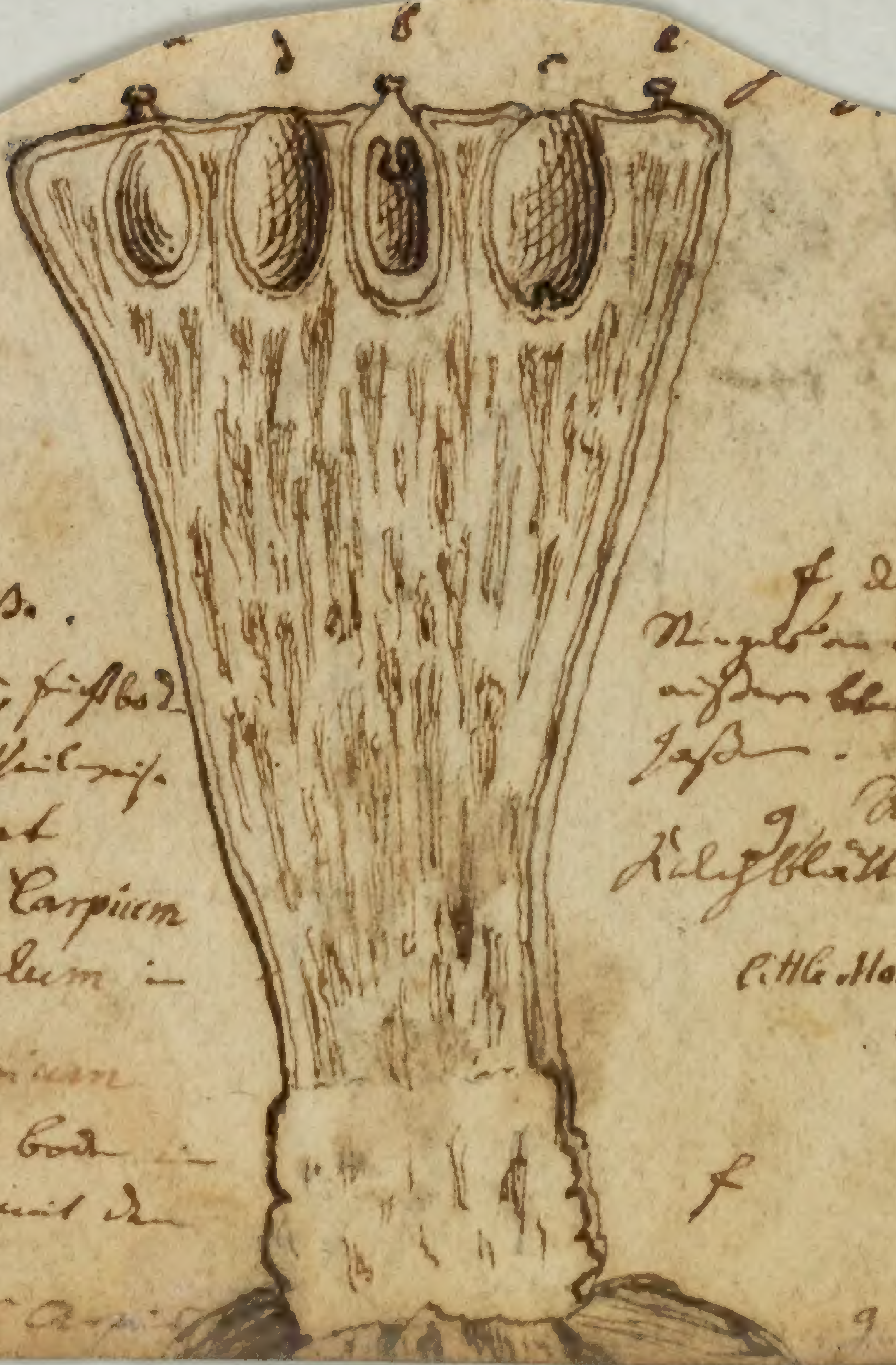
Durchschnitt des Fruchtbodens von
Nelumbium luteum, natürl. Größe.

Schwammig zelliger Körper, Fruchtboden
a, Carpium ~~Ovulum~~ mit dem Pistill, theilweise
bloßgelegt aber nicht geöffnet
b, durchgeschnittenes ~~Ovulum~~ Carpium
Pistill oben, hängendes Ovulum in
der Höhle sichtbar.
c, Höhle aus der ein Carpium
genommen ist, unten im Boden
Nähte, wodurch das Carpium mit dem
Fruchtboden verwachsen war.
d, andere [illegible] Höhle mit Carpium
[illegible]



f, der Theil des
Ringes an dem die
äußern Blumentheile
saßen.
g, Reste der
Kelchblätter.

C. Hl. Mowella
July 1835

[illegible]

[illegible]

[illegible]

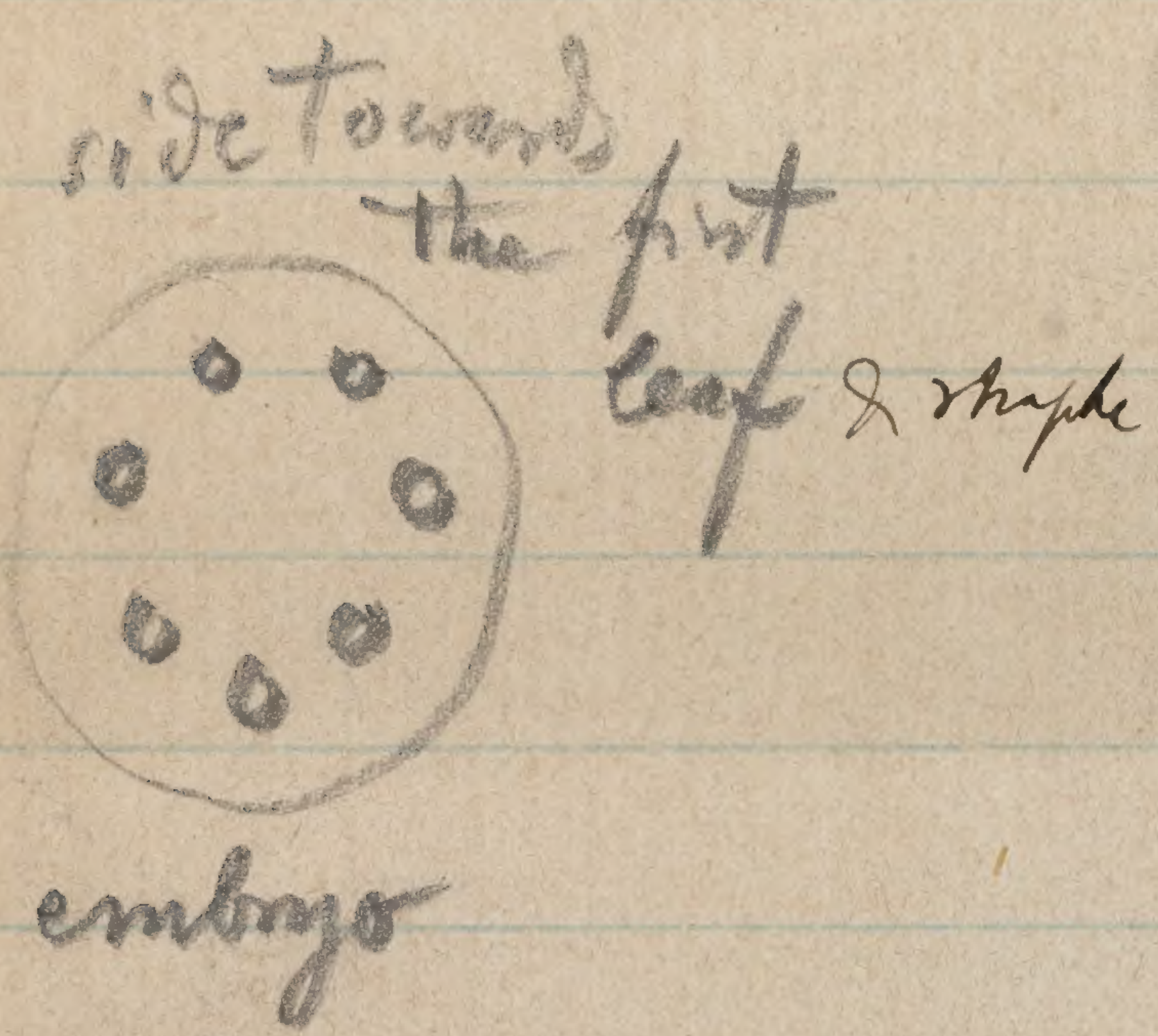
[illegible]

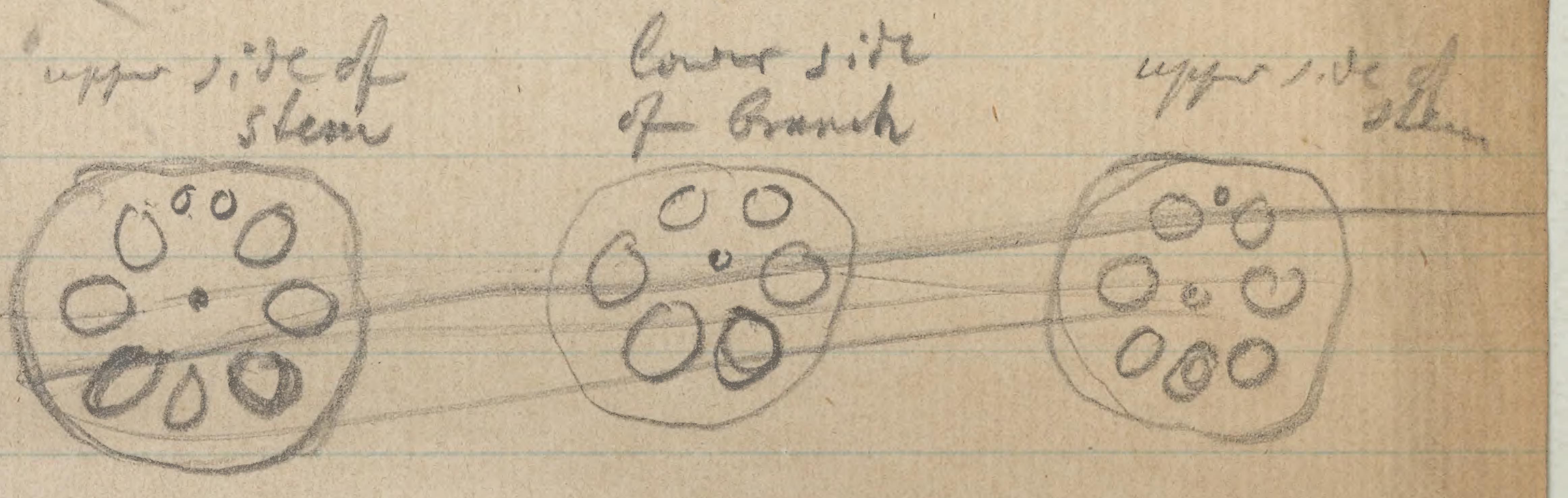
[illegible]

Missouri

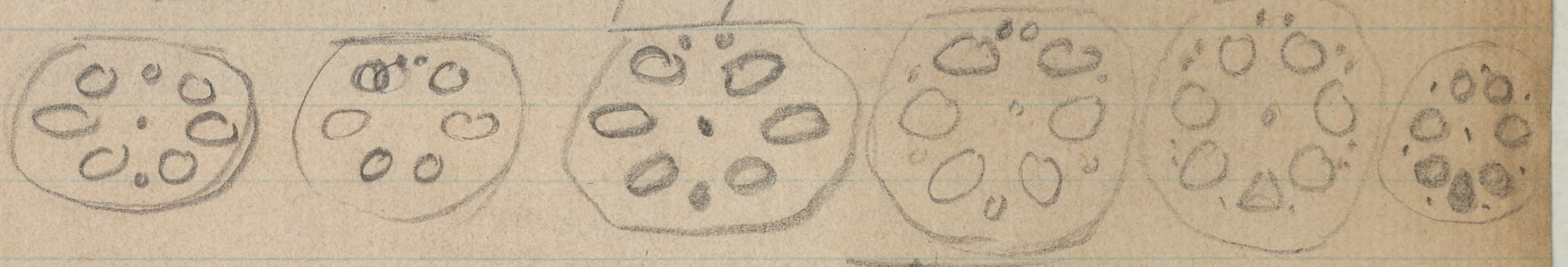
14 Octb 1860

upper or posterior side of stem with 2 small tubes (or one, or even none) lower or anterior side with one larger one

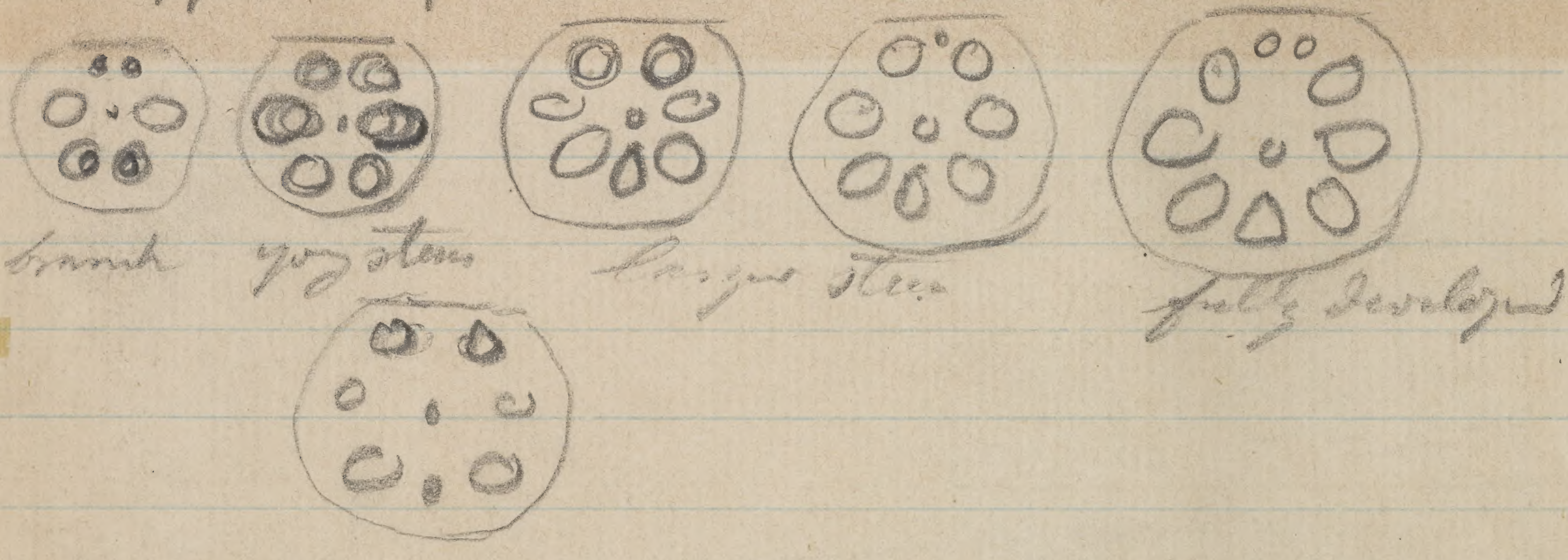

side towards the first leaf & stipule
embryo

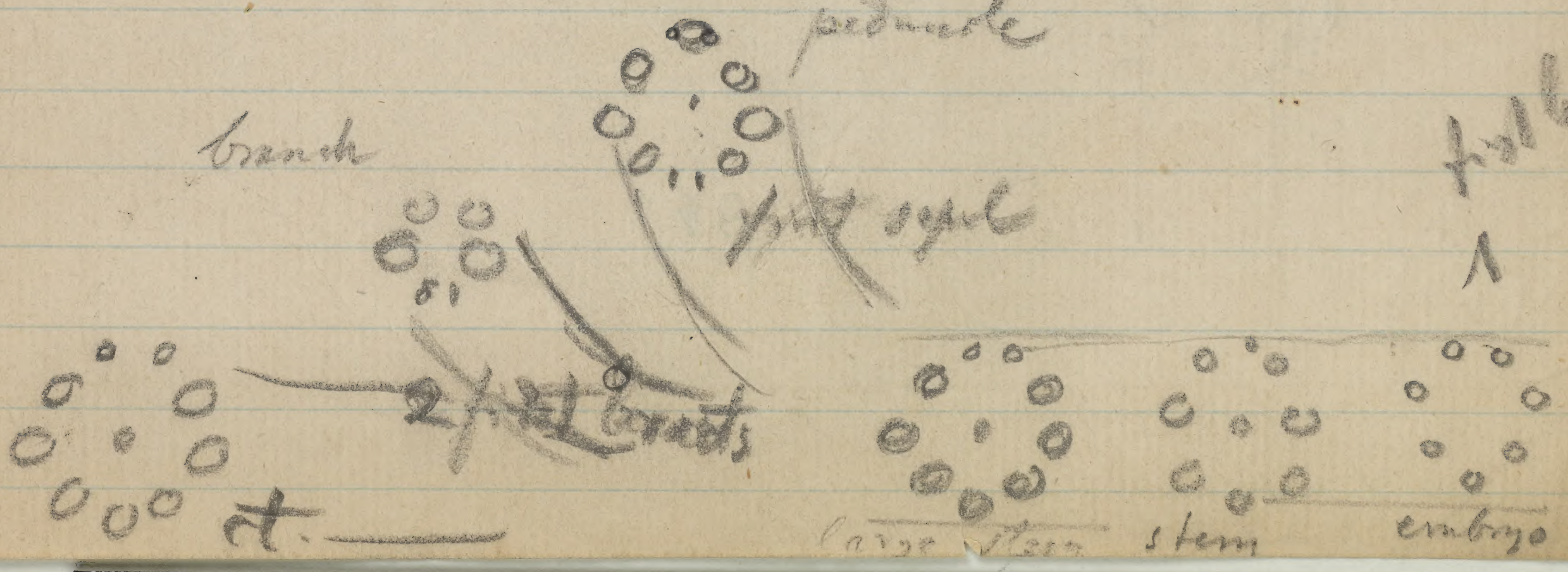

upper side of stem
lower side of branch
upper side of stem

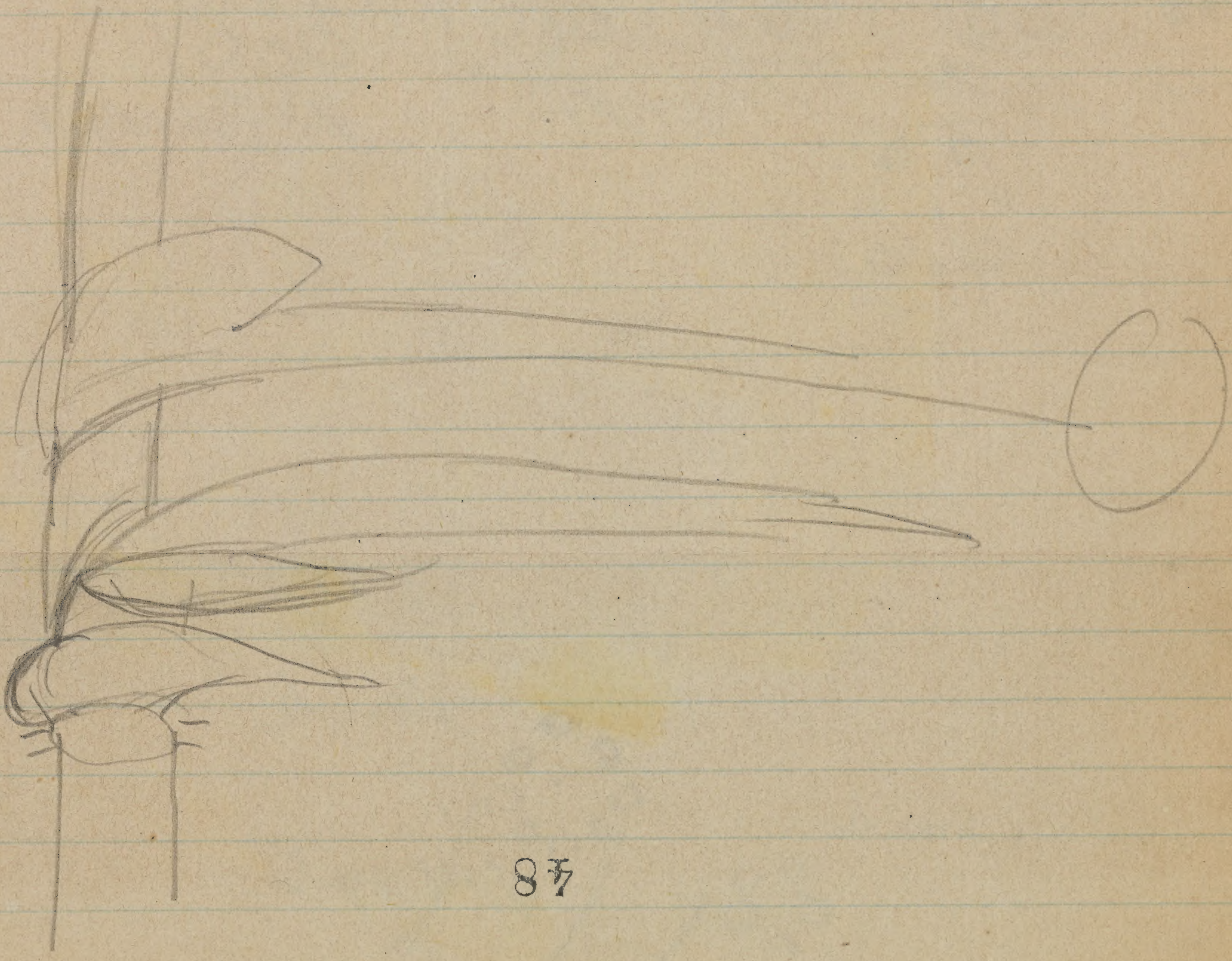
anterior side of petiolule



upper or posterior side of stem


branch
young stem
larger stem
fully developed


peduncle
branch
first sepal
first leaf
1
2 first bracts
ct.
large stem
stem
embryo



e bractea. extima exinvolvens

g — floriger~~ans~~

p pedunculus

f petiolus & folium

s. bractea ~~ramum suffultans~~ ~~florigera~~ fulcr.

ct continuatio

r ramus

i bractea inferna

b — basilaris

e
g
pd
f
p
ct
rm
i
b.

a
b
pd
d
p
f
e

Ceph. hypericifolia

glomeruliflora

lasiocarpa.

Ind. or. Banks : 116 Jary

Deccan. Hügel 1413

" 4787

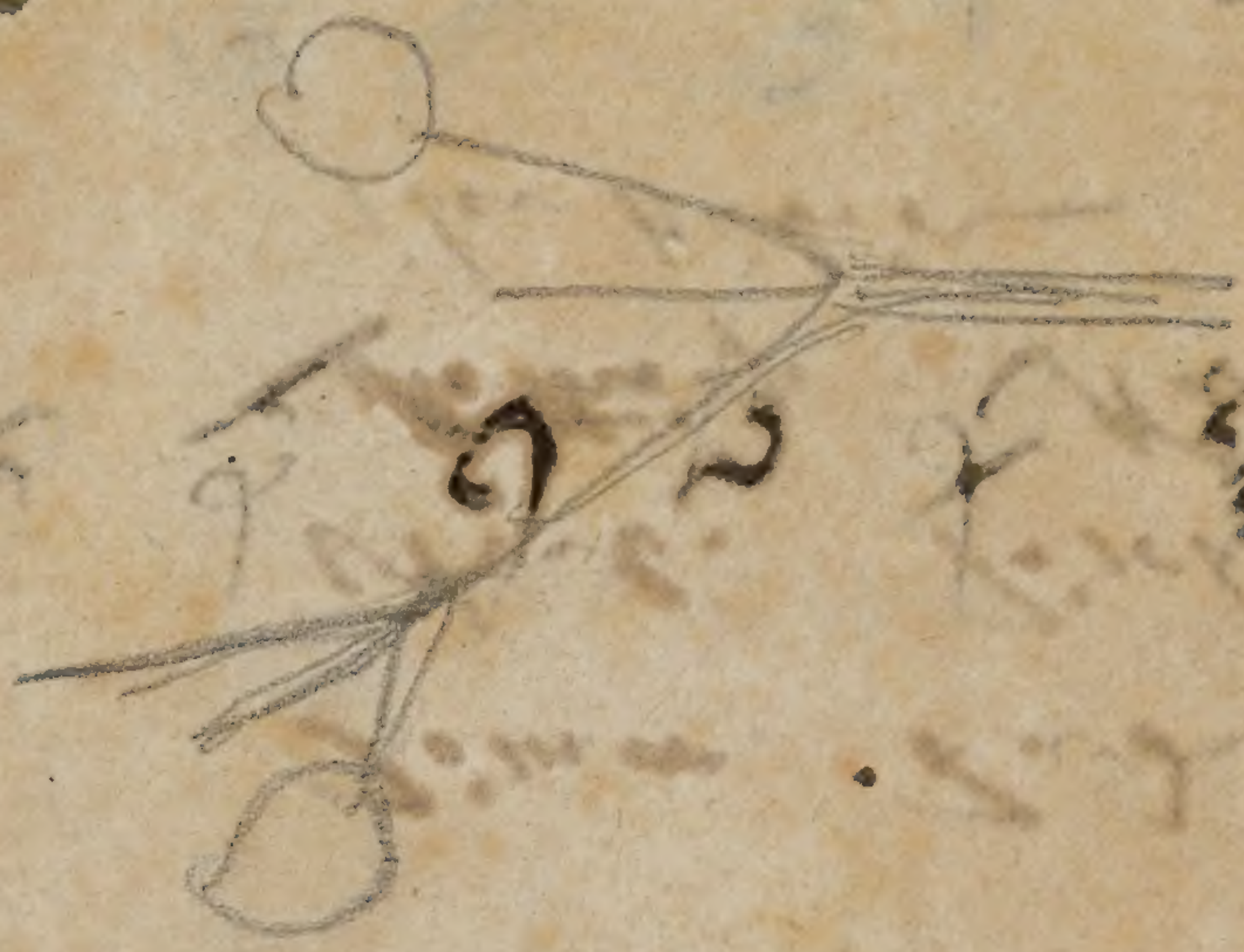
Timor. F. Bauer 79

Arab. Fischer 183 Schimper 757

Aethiop. Kotschy 509

iter nubicum " 334

49

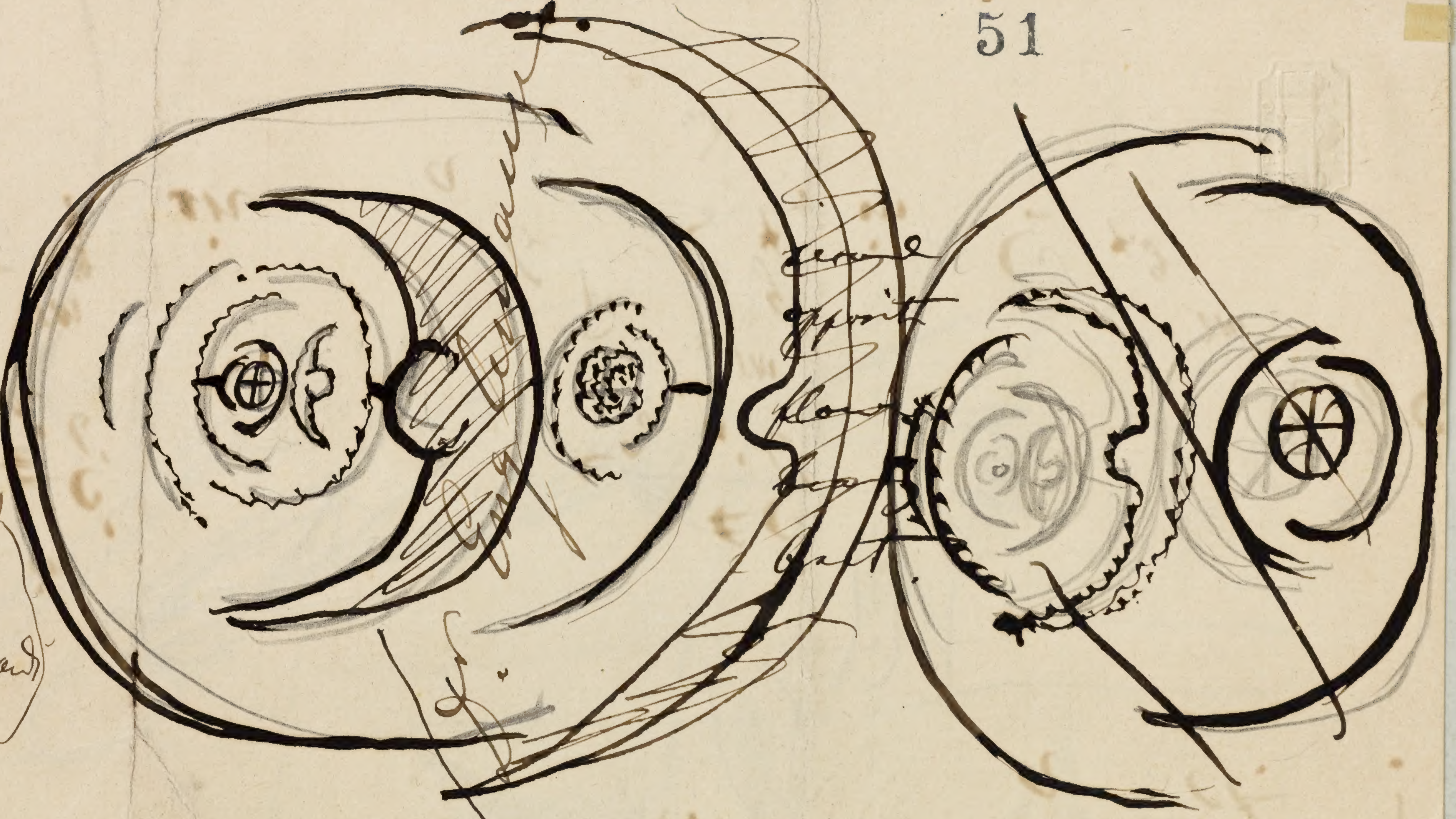


Convex

surrounding

(perforated
by central part
of stem
& turned upwards)

Bract.



leaf & stipule (this also perforated
by branch

left bract enveloping, cleft
right bract. — flower left sepal
right sepal
right leaf & stipule ———— Branch, left bifid bract.
left entire bract.
left bracts enveloping, cleft
right bract, enveloping, cleft
right bract — flower left sepal
left bract. flower bearing ——
right sepal
right leaf & stipule ———— Branch left leaf —— branch bearing

a
b
C
in
m
pd
e
c
d
ct
x

Mr Gaertche would
like to see Dr Engelmann
in the course of the day.

8th Street
Jan'y 18th /68

Nelumbium

Sept 22d 1860

Some of the largest tubers were cooked. Boiled as well as baked they were not as soon done as Potatoes but required a longer time. nevertheless they remained firm and kept their shape perfectly well. Inside they look reddish. Baked they were much better than boiled and had a mealy and sweet taste considerably resembling sweet potatoes, and very pleasant having nothing of the stagnant water taste about them.

Sept 30th My investigations about the manner of growth of Nelumbium are now nearly closed. It grows with astonishing regularity, and all the parts can be seen in the (smallest) bud even the flower, though it may never become developed.

In decomposition the tuber becomes gray and at last black, while the interior turns into a most beautiful violet colour, and the tubes are filled with fungous filaments, the odor is very fetid, considerably resembling rotten potatoes. The purple colour appears to emanate from deep purple globules which form in the cells, considerably larger than the starch and only one apparently in one cell

Nov. 1860

Enveloping bract is penetrated on its back, and remains entire on the upper part or bursts finally in two halves.

If entire it remains between the stipule and the leaf: see tab. 44 & 45.

The stipule is penetrated by the branch and usually, bursts in two halves.

the ~~[illegible]~~ inner basal bract of branch is oft. divided in two halves, but not penetrated.

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0 1 2 3 4 5 6 7 8 9 10
cm
copyright reserved
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* (see below) Nelumbium

The node is considerable thicker than the internode, and somewhat globose. It is not penetrated by the tubes, but contains between the twisted ligneous fibres often small & irregular cavities, connected with the tubes.

The roots spring from a belt, the lowest or hind most part of the node, which is interrupted above and below, forming 2 half belts, which are sometimes again slightly interrupted.

The roots are thick fibres, white, with short simple lateral fibres; they originate from the ligneous tissue and pierce through the thick cellular parts; before they pierce, they are indicated by protuberances

* (see above) The petiole has tubes quite similar to the branches, 4 larger lateral ones, those towards on the back being the largest, and 2 quite small ones on the back, and usually a small one in front and one on each side between the large ones, with or mostly without a central one.

The next organ, after the belt of roots is the enveloping bract e

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Nelumbium.

~~The node is thick~~

Under each node, or rather ~~the~~ the (or hindmost) part of each node

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Nelumbium octob 1860

structure of stems 1

The stem of the plumula is erect, and has 7 tubes; the pair on the side of the (first) lowest leaf (and towards the periphery of the torus and the funiculus) the odd one to the opposite side, at the second leaf.

The growing stem has from 6–9 tubes besides the central one.

In the smallest stem the 6 tubes are so arranged that the 2 smallest pair are placed on ~~form~~ the upper side, the largest pair on the sides and the middle sized pair on the lower side

(the tubes of the petiole are arranged exactly so, the back or posterior corresponding with the upper side)

In larger stems the six tubes already mentioned are more equal but a seventh is introduced at the lowest side, between the lowest pair, usually wedge shaped.

In still larger ones an 8th very small one is added above

and in the flower bearing ones usually ~~the~~ a second small one is added ~~to~~ the first one showing a pair of small tubes above.

(Tubers are constructed similarly only the tubes (usually 8 or 9 and a central one) are small, compressed, twisted.)

The first bract (e) is opposite to the pair of small ~~pair of~~ tubes.

While the lowest leaf of plumula is on the same side where they would be

The branches have an arrangement of tubes opposite to that of the stem.

Octob 1860

Nelumbium, structure of stem. 2.

The lowest branch is the scape peduncle, it has besides the central and a number of smaller ones, 8 to 9 regular tubes, usually with a pair (sometimes with a single one) small one, on the side opposite to the bract, in the axilla of which bears it and opposite to the arrangement of the stem tubes.

The lowest sepal of this flower-branch is opposite to the floriferous bract, therefore on the side of the small tubes

The second branch, born on the same side in the axil of the leaf has always 6 tubes, the smallest pair on the lower side opposite to the leaf in the axil of which it rises, and also opposite to the arrangement of the stem tubes.

The lowest bracts of the branch both on the same side, are (equally as the lowest sepal) opposite to the proliferous leaf, therefore on the side of the smallest tubes.

The flowering branch or scape or peduncle becoming erect, grows up with no twist or a very slight one

The leaf bearing branch however being destined to grow horizontally twists where it grows in soft mud so that the pair of small tubes and consequently the flowerbearing bract and the branch bearing leaf come from the now upper side, and the whole has the arrangement of the stem itself.

Nelumbium, Structure of stem 3. Octob 1860

Where the mud is too hard, the twist can not take place, as it seems; and in that case, the leaf and bracts and continuation of stem (terminal bud) are curved from the lower side upwards.

The continuation of the stem itself is exactly like its older part, even ~~with~~ continuing some odd shaped or some accessory tube where the previous joint is fully matured; or where this is young & containing fewer tubes, more tubes are gradually added, or those already present enlarged and more fully developed.

During spring and summer the ~~tubes~~ stems grow cylindrical or more or less ~~com~~depressed but towards fall the latest growth forms shorter and thicker tuberous stems, filled with Amylon, which with their buds are (probably) all that lives through winter and continues the plant in the following spring.

To the long internode of stem, which at its upper end bears the rootlets, follow 3 short and crowded internodes, 1 with ventral external enveloping bract, 2 with dorsal, flower bearing and leaf enveloping bract, and a third long one with leaf itself the branch bearing stipulated, at the anterior end of ~~their connecting in~~ the long internode comes ~~and~~ a complete repetition of the same system.

The leaf-branch has at its base, opposite to the branch-bearing leaf, two bracts, one above the other, the lower outer one notched or bifid, the inner one larger, entire but usually at last splitting in two.—

Dr E.

(on the Morphology of ~~Nelumbium~~ luteum

~~Dr E. resumed and concluded his remarks on Nelumbium luteum~~ illustrated by a great many drawings ~~continued from several meetings~~ (commenced at a former meeting), of ~~which the following is an brief synopsis~~, ~~with of the remarks~~

These Nelumbium ~~so~~ common in our deep stagnant waters, ~~is~~ not only one of our most showy plants, with the largest leaves, & largest flowers, with ~~excellent~~ edible seeds and ~~edible~~ large tubers, but it is also one of the most curiously constructed plants, following with astonishing regularity its peculiar but very simple ~~type~~ ~~morphological~~ laws, ~~and never deviating from them~~. — ~~These~~ ~~structure~~ Its morphology has attracted the attention of botanists ~~before~~ and Mr. A. Trécul especially has tried to develop its ~~morphological~~ peculiarities giving a ~~and has~~ ~~also~~ ~~giving a forced explanation~~ of them. Prof. Caspary also has studied the plant very attentively and intelligently (without however thus far publishing anything about it); ~~but~~ I have believed that the ample material at ~~my~~ my disposal being ~~permitted~~ me to make some observations which may have escaped my predecessors.

The structure of the seed ~~as~~ well known I will therefore only ~~repeat~~ state, that the (large green plumule) lower leaf of the (always directed towards the ~~[illegible]~~ raphe) has at ~~the~~ base ~~[illegible]~~ petiole only a ~~dilated~~ narrow rim surrounding the stemlet, ~~which~~ indicative of ~~replacing~~ the stipule of the ~~[illegible]~~ following leaf. The stipule of this one encloses the following leaf, and the stipule of the ~~third~~ the fourth leaf all of them ~~will~~ already preformed in the seed. ~~After~~ these distinctly arranged leaves have ~~grown~~ ~~[illegible]~~ been developed, the ~~stem~~ young stem reclines in the mud and now begins the mode of vegetation which ever after characterizes the plant. The stem reclining on or in the mire of the lakes or ponds one side ~~of course~~ is the upper or dorsal the other the lower or ventral one, the direction towards the growing part of the stem I shall call the anterior, that towards the ~~older~~ parts, the posterior side. The elongated internode now resting horizontally on the ground is terminated at its anterior end by a bud a ~~[illegible]~~ budscale (hidden ~~having in~~ in an ~~(a) opposite~~ ~~[illegible]~~) to the leaf two short crowded internodes, the ~~[illegible]~~ one with one is also a ~~bract~~ with scale or (b)

which precedes it therefore ventral or directed downwards, the ~~next~~ ~~[illegible]~~ a going in the opposite direction to the last, or upwards ~~one directed~~, upwards, ~~in the same direction as the preceding leaf~~; ~~the next internode~~ then comes in the same upward direction ~~that~~ a single leaf, (c) with a sheathing stipule at base. The long internode ~~[illegible]~~ connected with this leaf follows ~~again~~ the same direction ~~course~~ ~~again~~ and thus we have the simplest organization of the plant, before it arrives at ~~full~~ maturity: 2 ~~bracts with~~ scales (with short internodes) in opposite direction and a leaf in the ~~same~~ direction ~~of~~ the last scale, with a long internode. The roots, ~~formation~~ of the roots is performed by numerous thick fibres being single fibrils, springing ~~in two halfbelts separated [illegible]~~ from ~~the~~ thickened node just below or rather behind the lowest scale, in ~~the~~ belt divided by two naked grooves above and below into two halfbelts. —

~~The flower bearing plant develops no other organs~~

~~As~~ Soon as the ~~[illegible]~~ plant ~~[illegible]~~ prepares for propagation ~~in two manners~~; ~~by forming first buds or branches and then flowers and fruit~~, and this also in the most simple as well as most constant manner, a single branch and a single flower ~~[illegible] and flowers~~ ~~stem & flower~~ ~~being developed~~. ~~but these single organs or their germ are~~. The flowering erect ~~stem~~ (p d) is produced from the axil of the scale b, ~~close to the base of the~~ and bears on its top the two lowest organs of the flower, which might be named bracts or sepals the lower one (d) opposite the scale, the anterior ~~[illegible]~~, the upper one (e) opposite to the last or posterior. The following and very numerous organs of the flower follow more complicated laws of phyllotaxis.

The branch (r m) springs from the axil of the leaf, and bears at its base two scales (f & g) one above the other, both opposite to the leaf, or anterior, to which a long internode succeeds, which at its end recommences the succession of organs of the stem, ~~so that then as described before~~, ~~But it will be seen that the arrangement just detailed, that~~ explained so that the scale a is ~~oppos~~ in direction opposite to ~~of the scales~~ f & g, b and c in the same direction. + ~~But it will be seen that~~ then the

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